The Electric Form Factor of the Neutron via Recoil Polarimetry to $Q^2 = 1.47$ (GeV/c)^2

Bradley Plaster (for the Jefferson Laboratory E93-038 Collaboration)
Massachusetts Institute of Technology, Cambridge, MA 02139

The Jefferson Laboratory E93-038 collaboration measured the ratio of the electric form factor to the magnetic form factor of the neutron, G^m_E/G^m_M, via recoil polarimetry from the E m quasielastic ^{2}H($\vec{e}$, e' $\vec{\eta}$) 1H reaction at $Q2$ = 0.45, 1.15, and 1.47 (GeV/C)^2 in Hall C of the Thomas Jefferson National Accel- erator Facility from September 2000 to April 2001. In elastic electron-neutron scattering, the ratio of the transverse compo- nent to the longitudinal component of the recoil neutron's polarization, $P_t/P_l \equiv \tan\delta$, is proportional to G^m_E/G^m_M. A polarimeter designed specifically for E93-038 [1] was used to measure the up-down scattering asymmetry from a transverse component of the recoil neutron's polarization vector, and a dipole magnet located in front of the polarimeter was used to process the polarization vector through an angle X in order to measure the up-down scattering asymmetry from different transverse projections. After precession through the magnetic field, the transverse component and hence the asymmetry is proportional to sin (X+δ); therefore, G^m_E/G^m_M can be obtained by extracting the phase shift δ from a fit of the scattering asymmetries as a function of X. Analysis methods and preliminary results for G^m_E at Q^2 = 0.45, 1.15, and 1.47 (GeV/C)^2 will be presented.

[1] R. Madey et at., A.I.P. Proceedings No. 339, 47-54 (1995). 1 Research supported in part by the NSF and the DOE.